Identifying priority community areas for targeted HIV programming to optimize HIV resource allocation: a multi-stage pilot in Malawi

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BACKGROUND / INTRODUCTION

- HIV epidemics in Eastern and Southern Africa are highly spatially heterogeneous, with risk of HIV transmission being disproportionately higher in some communities compared to others.
- National and regional HIV programs must efficiently prioritize those at highest risk of poor HIV outcomes and onward transmission as HIV incidence and prevalence decrease and health investment priorities shift.
- Geospatial mapping is a promising strategy for utilising epidemiological data to identify specific geographical areas that require prioritisation. However, it is unclear what level of spatial detail is possible or optimal in resource-constrained settings. We piloted a methodology for identifying communities in Malawi that need to be prioritised for resource allocation to sustain long-term HIV epidemic control.

METHODS

- We designed and piloted a three-step strategy for identifying priority areas (areas with the highest risk of poor HIV outcomes) within facility catchment areas in four health facilities from three districts of Malawi (Dowa, Lilongwe and Mulanje). Facilities were purposively selected.

Step 1: Scoping Review

Aim: To identify factors associated with HIV risk at community level.

Eligibility:

- Article focused on HIV transmission at community level
- Publication period 2000-2024
- Focused on low- and middle-income countries (LMICs).

Scoping review guided by the following questions:

i. What HIV indicators are most associated with risk of HIV transmission at community-level?

ii. What contextual factors (i.e., community-level characteristics) are associated with community-level risk of HIV transmission?

We searched articles from PubMed, Medline, Google Scholar and CABI Global Health databases.

Step 2: National Geospatial Mapping

Aim: Identify priority communities at district, group village head (GVH) and facility level using geospatial mapping.

Methods:

- Coordinates for villages within GVH assigned to hexagonal grids.
- Grids aggregated to define GVH boundary and facility catchment boundary.
- Bayesian geostatistical model used to estimate population size and viral suppression for each grid using data from household survey (DHS, PHIA) and routine health facility data for 2015-23.
- Gridded data used to estimate HIV viremia (>1000 copies/ml) in each GVH and facility catchment.

Step 3: Deep Dive Community Mapping

Aim: Identify priority community areas by combining medical chart data and stakeholder mapping.

Methods:

- Reviewed and disaggregated facility level data for two years (May 22-April 24) by GVH.
- Indicators reviewed (informed by Step 1): newly diagnosed HIV positive, interruption in treatment (IIT ≥28 days) and high viremia (>1000 copies/ml).
- Workshops with HCWs, representatives of PLHIV groups, local leaders and community members (youth and adults). Involved mapping social determinants, sexual risk behavior and use of HIV services with HIV outcomes.
- Descriptive statistics (frequency and percentage) used to assess prevalence and facility catchment maps to identify priority communities.

- We analysed data from one-pilot site to demonstrate how to combine facility-level data and stakeholder mapping to identify priority communities.

RESULTS

Scoping review

- In total, 104 articles meeting the eligibility criteria were included; 84/104 (81%) were published after 2015.
- At individual level, strong predictors of HIV incidence were HIV prevalence and viremia.
- At community level contextual factors of mobility, economic activity, poverty, and extreme weather were associated with both prevalence and viremia.

National geospatial mapping

- 3/26 (12%) facility catchment areas in district Y had the highest viremia (1.1%-1.4%)

Deep Dive Community Mapping: Medical charts data and stakeholder mapping

- Results from facility X deep dive showed:
  - Disaggregated medical chart data identified 3/12 (25%) GVHs with indicators >10% (G, F and E) (table 1).
  - Stakeholder mapping workshops identified 8/12 (67%) priority GVHs (fig 2).
  - Combined, disaggregated medical charts data and stakeholder mapping identified 3/12 (25%) priority GVHs (fig 2).

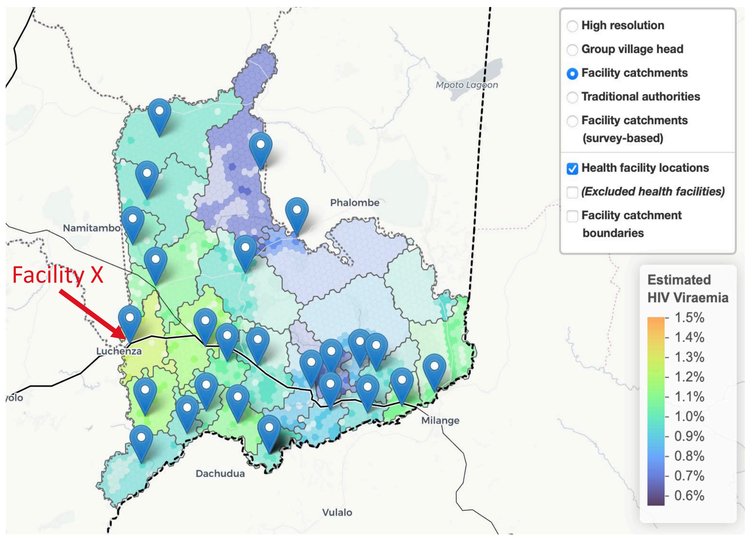

*Figure 1: Facility level viremia in district **Y***

Table 1. HIV outcomes of interest in community areas at facility X

	INDICATOR			
GVH	**Proxy ART Cohort^ (n)**	**New_Pos n (%)**	**IIT n (%)**	**High_Viremia n (%)**
GVH G	611	67 (11.0)	181 (29.6)	90 (14.7)
GVH I	503	46 (9.1)	119 (23.7)	47 (9.3)
GVH C	327	9 (2.8)	33 (10.1)	0
GVH F	146	26 (17.8)	95 (65.1)	18 (12.3)
GVH E	198	22 (11.1)	80 (40.4)	21 (10.6)
GVH A	455	2 (0.4)	14 (3.1)	7 (1.5)
GVH H	188	7 (3.7)	14 (7.4)	11 (5.9)
GVH L	603	14 (2.3)	67 (11.1)	25 (4.1)
GVH B	679	52 (7.7)	102 (15.0)	31 (4.6)
GVH D	243	18 (7.4)	49 (20.2)	16 (6.6)
GVH J	303	9 (3.0)	33 (10.9)	3 (1.0)
GVH K	156	3 (1.9)	4 (2.6)	0
Outside catchment		268	529	139
No address		4	4	0
Total	**4,412**	**547**	**1324**	**408**

^Estimated using facility cohort size and population density of the GVH

Figure 2: Community areas with poorer HIV outcomes at facility X

CONCLUSION

- Mapping of priority communities is a promising strategy for optimizing resource allocation.
- Our strategy demonstrates how to optimally combine facility level data and community level mapping to identify areas that require prioritization below facility level. However, there is need to build geospatial capacity among program implementers to effectively scale this strategy.
- Next, we will scale-up the strategy and combine data from steps 1, 2 and 3; with full results expected to be available in July 2025.

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